

REMARKS

Prior to entry of this amendment, claims 1-20 are currently pending in the subject application. Claims 11-20 have been withdrawn from consideration. By the instant amendment, claims 1-2 have been amended, claims 11-20 have been cancelled, and claims 21-23 have been added. Claim 1 is the only independent claim.

Applicants appreciate the Examiner's acknowledgement of applicants' claim for foreign priority and receipt of a certified copy of the priority document.

Applicants further appreciate the Examiner's acceptance of the drawings filed on January 15, 2004.

Applicants still further appreciate the Examiner's consideration of applicants' Information Disclosure Statements filed January 15, 2004 and June 24, 2004.

A. Asserted Anticipation Rejection of Independent Claim 1

In the outstanding Office action, the Examiner rejected claim 1 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,336,697 to Fukushima ("the Fukushima reference"). Applicants respectfully traverse this rejection, and respectfully submit that claim 1, as amended, is believed to be in condition for allowance for at least the reasons set forth below.

Independent claim 1 has been amended to differentiate over the Fukushima reference, in particular, to recite that the magnitude and location of the electric field in the front end of the nozzle is modified in order to vary the ink's surface tension, and subsequently, separate it into droplets, as supported by ¶¶ 60-62 of the application as filed. Amended claim 1 recites,

- A method of ejecting ink comprising:
- (a) filling a rear end of a nozzle with ink using a capillary force, the rear end of the nozzle being surrounded by a hydrophilic layer;
 - (b) forming an electric field directed toward an outlet of the nozzle on a front end of the nozzle, the front end of the nozzle being surrounded by a hydrophobic layer;

(c) modifying a magnitude and location of the electric field to
varying a surface tension of ink to separate ink droplets having a
predetermined volume from ink and to move the separated ink droplets
within the front end of the nozzle toward the outlet of the nozzle; and
(d) ejecting the separated ink droplets through the outlet of the
nozzle.

The amendatory language distinguishing the present invention over the prior art is important because localized electrostatic control of specific separate electric field segments in the front end of the nozzle provides precise control of the ink speed and its drop size in the nozzle. The Fukushima reference, on the other hand, does not teach or even remotely suggest such localized control of the electric field in the nozzle. In fact, the Fukushima reference teaches only to form an electric field in the *entire* front end of the nozzle, while the control of the ink speed and the size of its drops are maintained by the pressure of the piezoelectric element and the length of the nozzle (significant point development). *Fukushima, col. 11, lines 30-61; col. 15, lines 23-42.*

In view of the above, applicants respectfully submit that the Fukushima reference fails to disclose, or even suggest, each and every element of claim 1, and therefore, claim 1 is believed allowable over the cited prior art. Accordingly, applicants respectfully request that the rejection of claim 1 and its dependent claims be reconsidered and withdrawn.

B. Asserted Anticipation Rejection of Dependent Claims 2-10

In the outstanding Office action, the Examiner asserted that the Fukushima reference anticipates each and every element of claims 2-10 as well. Applicants respectfully traverse this rejection and respectfully request allowance of claims 2-10 as dependent from allowable amended independent claim 1. Additionally, applicants respectfully submit that the Examiner

failed to set forth a *prima facie* case of anticipation with respect to claims 2-10 for at least the reasons set forth below.

With respect to claim 2, the Examiner cited Fig. 6 and col. 15, lines 11-30, of the Fukushima reference as support for disclosure of the sequential voltage application claimed in the present invention. The Examiner also stated that "Fukushima meets the claimed limitations since the affinity regions (Fig. 6, elements 141-14n) and the electrodes (Fig. 7, elements 201, 202) are functional equivalents." *Office action, mailed April 13, 2006, p. 4.* This analysis is inaccurate for several reasons. For one, the Fukushima reference does not teach or suggest *sequential* voltage application to a plurality of electrodes. In particular, the Fukushima reference teaches simultaneous voltage application to two electrodes (Fig. 7, elements 201, 202) in order to form an electric field between them. Additionally, affinity regions and electrodes as disclosed by the Fukushima reference cannot be considered functional equivalents, because while affinity regions are intended to provide gradual change in ink affinity, there is no teaching or suggestion in the Fukushima reference as to achieving similar *gradual change* in ink affinity by electric field modification. Therefore, the Fukushima reference fails to disclose, or even suggest, all elements of claim 2. Further, claim 2 has been amended to clarify that the electrode pads are connected in series, as supported by Fig. 10A-10E (elements 151-153). Accordingly, applicants respectfully request that the rejection of claim 2 and its dependent claims be reconsidered and withdrawn.

With respect to claims 3-8, it should be noted, as mentioned previously with respect to claim 2, that the present application refers to sequential voltage application to electrode pads configured in series. As such, the electrode pads may be operated separately to form separate electric fields of different magnitudes and locations in the ink nozzle in order to, among others,

separate the ink into ink droplets. As such, the Examiner's comparison on pages 4-5 of the outstanding Office action with respect to claims 3-8 between the sequential electrode pads and the two electrodes in the Fukushima reference is improper. There is no teaching or suggestion of electric field control or its use for separating ink into droplets in the Fukushima reference, much less any teaching or suggestion of size or speed control of ink droplets by electrostatic force. Accordingly, the Examiner's reasoning on page 4-5 with respect to claims 3-8 is unsupported, and applicants respectfully request that this rejection be withdrawn.

With respect to claims 9-10, it should be noted that the Fukushima reference does not teach or even remotely suggest ejection of ink droplets by way of electrostatic force or reduced atmospheric pressure. In particular, the Fukushima reference fails to suggest the formation of an electric field between the nozzle outlet and the paper or use of fluid flow at the outlet of the nozzle to form a pressure differential, as suggested in the present invention, see e.g., ¶ 69 of the original specification. Accordingly, the Examiner's reasoning on page 5 of the outstanding Office action with respect to claims 9-10 is unsupported, and it is respectfully requested that this rejection be withdrawn.

C. New Claims 21-23

Claims 21-23 are added by the instant amendment. No new matter is added, and support for these claims may be found in the application as originally filed on page 3, ¶44 and page 4, ¶¶52-54, respectively. Applicants respectfully request entry and examination of claims 21-23.

D. Conclusion


If the Examiner believes that additional discussions or information might advance the prosecution of the instant application, the Examiner is invited to contact the undersigned at the telephone number listed below to expedite resolution of any outstanding issues.

In view of the foregoing amendments and remarks, reconsideration of this application is earnestly solicited, and an early and favorable further action upon all the claims is hereby requested.

Respectfully submitted,

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Any additional fee(s) necessary to effect the proper and timely filing of the accompanying-papers may also be charged to Deposit Account No. 50-1645.